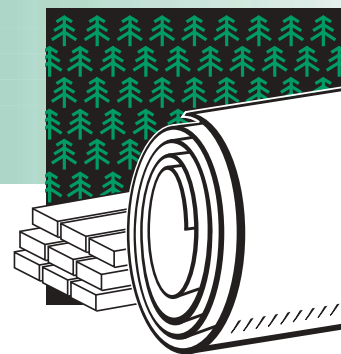


FOREST PRODUCTS

Success Story



CHEMICAL FOR INCREASING WOOD PULPING YIELD

Novel Chemistry Improves Pulp Yield While Reducing Energy and Chemical Requirements

Benefits

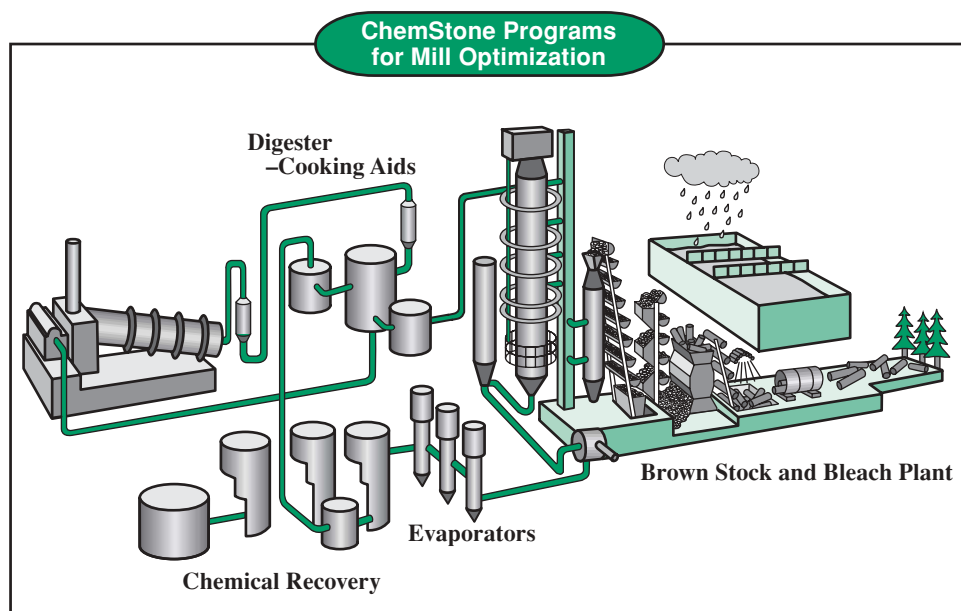
- ◆ Production of better-quality pulp through less harsh cooking of the wood chips and less refining of the pulp, reducing rejects
- ◆ Reduced consumption of raw wood for required production and decreased use of bleaching chemicals to reach the required brightness
- ◆ Reduced sulfur-based emissions such as hydrogen sulfide and methyl mercaptans
- ◆ Energy savings of 0.5 million Btu/ton of paper produced
- ◆ Increased yield per ton of wood of 2% to 5%

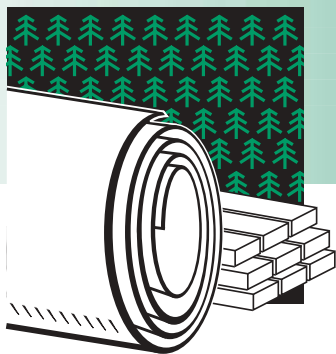
Applications

This process can be used in all pulping processes.

The U.S. pulp and paper industry has been a leader in finding ways to minimize the environmental impacts of the paper-making process through innovations such as recycled fibers, alternate bleaching chemicals, and water system shutdowns. Now, by changing the process of “cooking” wood chips into the pulp from which paper is made, manufacturers can cut the amount of virgin wood feedstock they need and increase pulp yield and quality at the same time.

In 1996 ChemStone, Inc., a specialty producer of chemicals for the wood pulp industry, was awarded a grant from the U.S. Department of Energy’s NICE³ (National Industrial Competitiveness through Energy, Environment, and Economics) Program to look for opportunities to realize synergies in the chip-cooking process. “Uneven processing of wood chips has always been a big headache for manufacturers because it lowers uniformity and quality and leads to the need for reprocessing,” said Chris Bigalke, ChemStone’s general manager. The NICE³ grant enabled the firm to demonstrate its newly developed patented chemistry that results in better fiber breakdown, higher pulp yields, and cleaner pulp when added to the pulping process.





FOREST PRODUCTS

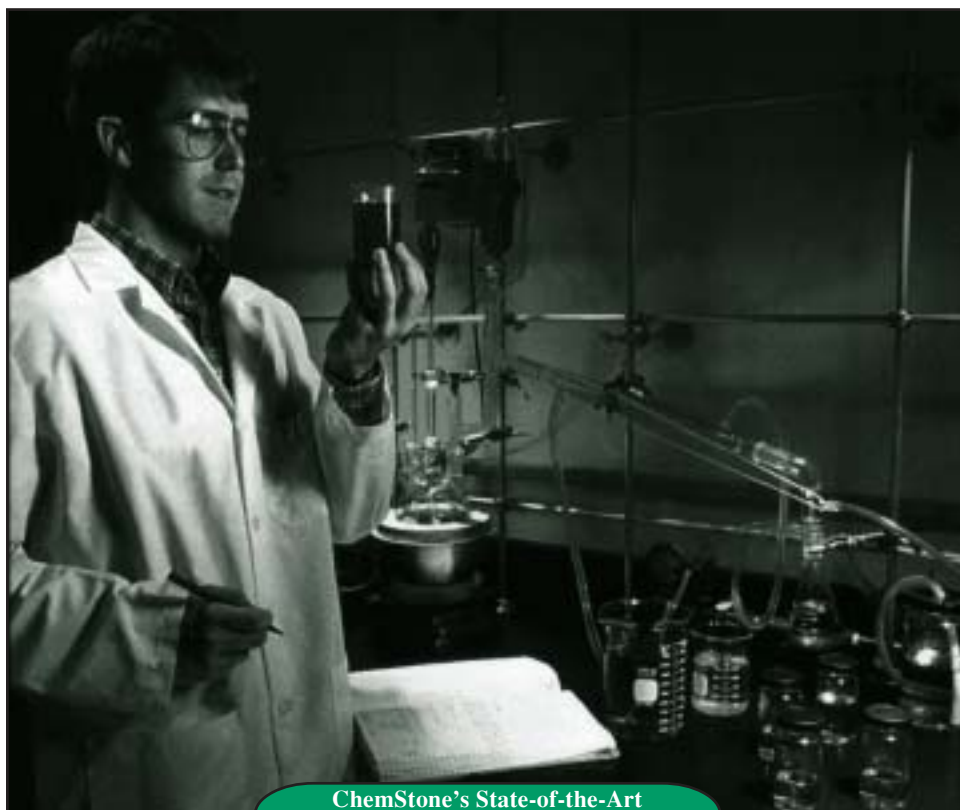
Success Story

Description of Chemistry

ChemStone's new chemistry is composed of molecules that uniquely remain soluble in the highly alkaline and hot pulp-cooking environment. The molecules help the cooking liquors penetrate the chip, resulting in more uniform cooking. The alkali uptake is increased by 30% in the first 15 minutes of cooking, resulting in more alkali in the chip and less in the liquor. "Basically a wood chip consists of water, cellulose, and lignin. The lignin is like glue holding the chip together. Our chemical process more effectively and quickly removes the lignin, so you're left with a high-quality cellulose, the basic building block of paper," Bigalke explained. The ChemStone chemistry is applied in the cooking liquor and is totally dispersed in the liquor environment. The chemistry can be used in all pulping processes including kraft, soda/anthraquinone (AQ), semichemical, and chemical thermo mechanical pulp (CTMP).

"The savings have the potential of reaching thousands of kilowatts per day per mill."

– Chris Bigalke
General Manager
ChemStone



ChemStone's State-of-the-Art
Research and Development Laboratory

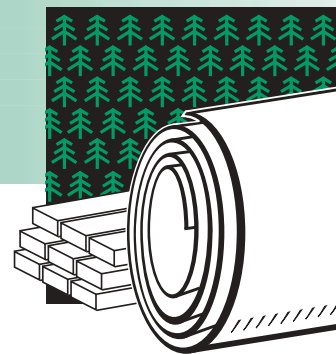


OFFICE OF INDUSTRIAL TECHNOLOGIES

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FOREST PRODUCTS

Success Story

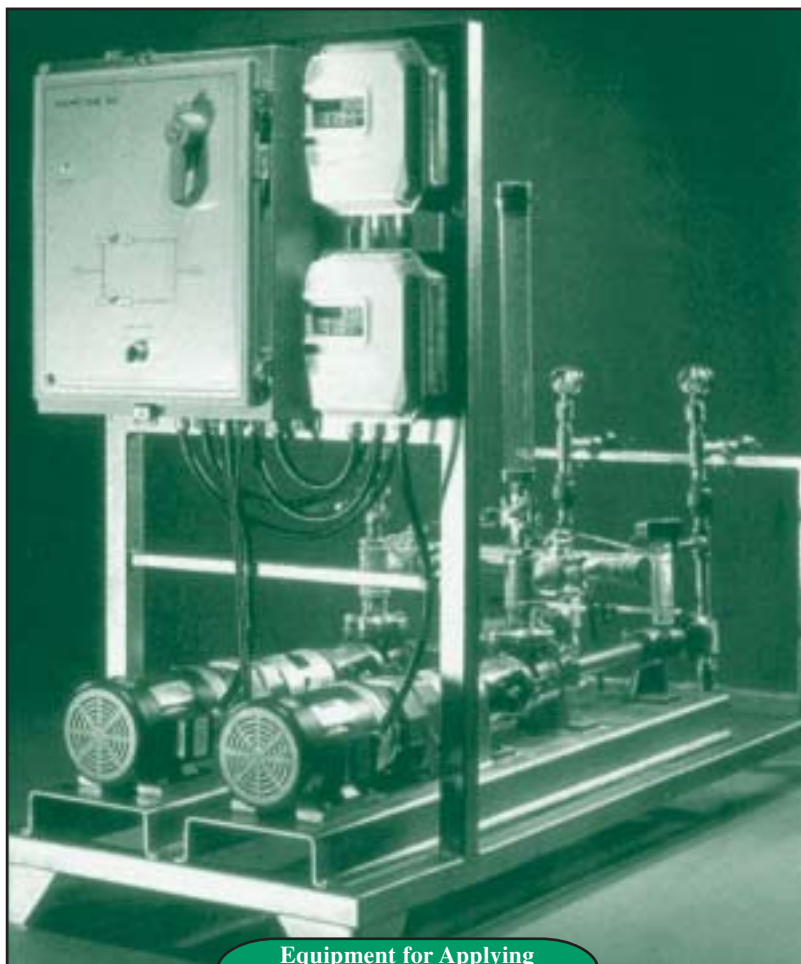


Project Partners

- ◆ ChemStone, Inc.
Greenville, SC
- ◆ South Carolina Energy Office
Columbia, SC

Benefits of Chemistry

With this new technology, pulp yield increases 2% to 5% per ton of wood; thus, up to 5% more of the cellulose going through the process becomes paper. In turn, less raw material is required for the same amount of product. The amount of rejected pulp is also reduced by 2% to 50% (depending on the length of the cook), which reduces the amount of energy required for refining, produces a better quality fiber, and allows the paper machines to run faster. "The savings have the potential of reaching thousands of kilowatts per day



Equipment for Applying
ChemStone's Novel Chemistry



per mill,” said Bigalke. ChemStone’s chemistry saves 100 lb of wood chips and 0.5 million Btu/ton of paper produced. The new chemistry also results in a net reduction of about one million tons of sulfur-based emissions, such as hydrogen sulfide and methyl mercaptans, which will not enter the air each year. Other benefits include a higher chemical recovery rate, fewer tons of landfilled waste, and reduced bleaching requirements.

The cost benefits are also significant. Using ChemStone’s chemistry results in a return between three and five times the investment per ton of wood pulp. The payback is immediate.

Commercialization Continues

ChemStone is increasing the number of mills testing the additive under a variety of conditions to achieve results such as reduced use of bleaching chemicals, decreased production of black liquor, and increased pulp yield. Sixteen pulp mills are currently using the technology either fulltime or for part of their production. “The NICE³ grant enabled us to rise above breakeven conditions and establish our marketing and distribution network,” Bigalke pointed out. “It did exactly what it was designed to do—help a start-up technology get on its feet. Now, we can concentrate on making this process available to the entire pulping industry in North America through a network of agents and distributors.” ChemStone is also currently active in establishing an international distribution network that includes South Africa, Europe, Indonesia, Canada, and Mexico.

INDUSTRY OF THE FUTURE — FOREST PRODUCTS

*Through OIT’s Industries of the Future initiative, the American Forest and Paper Association, on behalf of the forest products industry, has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In November 1994, the industry outlined its vision for maintaining and building its competitive position in the world market in the document, **AGENDA 2020: A Technology Vision and Research Agenda for America’s Forest, Wood & Paper Industry.***

OIT Forest Products Team Leader: Valri Robinson (202) 586-0937.



NICE³ – National Industrial Competitiveness through Energy, Environment, and Economics: An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry. This grant program provides funding to state and industry partnerships for projects that demonstrate advances in energy efficiency and clean production technologies. Awardees receive a one-time grant of up to \$525,000. Grants fund up to 50% of total project cost for up to 3 years.

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